

# **COMBINATION OF A GOLF CLUB HEAD AND A WEIGHT MEMBER**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

5           The present invention relates to a combination of a golf club head and a weight member.

### **2. Description of Related Art**

Fig. 1 of the drawings is a sectional view of a conventional golf club head, and Fig. 2 is a sectional view of another conventional golf club head.

10   The golf club head 10 is made of a material having a low specific gravity (or relative density) such as a titanium alloy, stainless steel, Fe-Mn-Al alloy, soft iron alloy, or other iron alloy. A weight member 20 is embedded in the golf club head 10 and made of a material having a high specific gravity, such as a W-Fe-Ni alloy or other tungsten alloy. The golf club head 10 includes a

15   recession 11 (Fig. 1) or notch 101 (Fig. 2) into which the weight member 20 is securely fixed by an appropriate means to form a golf club head product with a lower center of gravity while increasing the overall volume of the golf club head, increasing the thickness of the golf club head, and improving the striking effect without changing the overall weight.

20           Nevertheless, when bonding the golf club head 10 and the weight member 20 made of different materials together by welding, heat cracks and poor welding bead solidifying patterns are apt to be generated. Therefore,

brazing is usually used in the golf club head industry to bond the golf club head body 10 and the weight member 20 together. Nevertheless, the cost for brazing is high, as brazing includes use of a welding material containing expensive ingredients, such as silver, copper, titanium, nickel, etc. Further, metallographic arrangement and crystalline microstructure are adversely affected, as the golf club head 10 and the brazing material must be heated simultaneously. The overall structural strength and toughness of the golf club head are thus adversely affected. Further, it is difficult to control the amount of the welding material, the engaging relationship between the wall delimiting the recession 11 and the weight member 20, and the force for inserting the weight member 20. Further, a paste that is generally included in the brazing material comprises organic materials that easily volatilize when heated, resulting in outflow of the brazing material, unreliable filling of a gap between the weight member 20 and the wall delimiting the recession 11, generation of voids, and waste of the brazing material. The bonding strength for the weight member 20 by welding is adversely affected, and the operational difficulty of the brazing process is increased.

In addition to welding and brazing, the weight member 20 can be engaged with the golf club head 10 by pressing, insertion, or screwing. For example, U.S. Patent Nos. 6,592,468 and 6,616,547 both disclose use of a bronze plate on which a plurality of weight members are formed. Although this arrangement is simpler than the welding process and the brazing process,

surface crack, twist, and deformation are apt to occur to the golf club head, adversely affecting the appearance of the golf club head. Thus, this arrangement is not suitable for a golf club head having a small thickness, such as a golf club head of an XL-size wooden club.

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## OBJECTS OF THE INVENTION

An object of the present invention is to provide a combination of a golf club head and a weight member, wherein a filling material is used for fixing the weight member in the golf club head, providing a rapid and simplified process for mounting the weighting member into the golf club  
10 head.

Another object of the present invention is to provide a combination of a golf club head and a weight member, wherein a filling material is used for fixing the weight member in the golf club head, providing improved vibration-absorbing effect, improved striking stability, and improved gripping  
15 comfort.

A further object of the present invention is to provide a combination of a golf club head and a weight member, wherein a filling material is used for reliably fixing the weight member in the golf club head.

## SUMMARY OF THE INVENTION

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In accordance with an aspect of the invention, a golf club head includes a recession in a sole thereof, and a weight is securely mounted in the recession to adjust a center of gravity of the golf club head. A filling material

is provided to seal the recession and to bury and fix the weight member. The filling material simplifies the process for fixing the weight member in the golf club head and receives vibrations generated as a result of striking a golf ball.

Other objects, advantages and novel features of this invention will  
5 become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a sectional view of a conventional golf club head;

Fig. 2 is a sectional view of another golf club head;

10 Fig. 3 is a sectional view of a first embodiment of a golf club head in accordance with the present invention;

Fig. 4 is a sectional view of a second embodiment of the golf club head in accordance with the present invention;

Fig. 5 is a sectional view of a third embodiment of the golf club head  
15 in accordance with the present invention;

Fig. 6 is a sectional view of a fourth embodiment of the golf club head in accordance with the present invention;

Fig. 7 is a sectional view of a fifth embodiment of the golf club head in accordance with the present invention; and

20 Fig. 8 is sectional view of a sixth embodiment of the golf club head in accordance with the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention are now to be described hereinafter in detail, in which the same reference numerals are used in the preferred embodiments for the same parts as those in the prior art to avoid redundant description.

5 Referring to Fig. 3, a first embodiment of a golf club head 10 in accordance with the present invention is a club head of an iron club and made of a metal having a low specific gravity, such as a titanium alloy, stainless steel, Fe-Mn-Al alloy, soft iron alloy, or other iron alloy. The golf club head 10 includes a recession 11 in a sole (not labeled) thereof. A weight member 20  
10 is inserted into the recession 11. The recession has an opening (not labeled) that faces upward and that is sealed by the filling material 30.

The weight member 20 is made of a material having a high specific gravity, such as a W-Fe-Ni alloy. The weight member 20 has a sectional area substantially the same as that of the recession 101 of the golf club head 10.  
15 Thus, when the weight member 20 is mounted in the recession 11, a perimeter of the weight member 20 is in contact with a perimeter wall delimiting the recession 11, and a bottom face of the weight member 20 is in intimate contact with a bottom wall delimiting the recession 11.

The filling material 30 fills the opening of the recession 11 by means  
20 of heat pressing or injection molding, thereby burying and fixing the weight member 20 in the recession 11. Thus, the weight member 20 is reliably fixed in the recession 11. This burying process can be performed at room

temperature. The welding process, heating process, or high pressure applying process required in the prior art process for mounting a weight member into a recession of a golf club head is avoided; namely, the process for assembling the weight member 20 is expedited and simplified.

5           The filling material 30 is preferably made of a light material. Particularly suitable material includes a light material having a specific gravity smaller than 4.0. For example, the light material may be selected from a group consisting of resins (e.g., epoxy resin), high molecular polymer materials, rubber, thermoplastic elastomers, polyurethane elastomeric filling  
10 materials, carbon fibers, light alloys (e.g., titanium alloys, aluminum alloys, etc.), and adhesive composite powders thereof. The filling material 30 also provides a vibration-absorbing function. Thus, the vibrations resulting from striking a golf ball are absorbed by the filling material 30, improving the vibration-absorbing effect, improving the striking stability, and improving the  
15 gripping comfort. The filling material 30 fills the opening of the recession 11 by means of heat pressing or injection molding and provides improved bonding strength and improved burying effect. Further, the center of gravity of the golf club head 10 can be advantageously shifted downward by means of selecting a filling material 30 having an appropriate specific gravity, allowing  
20 flexible adjustment in the center of gravity of the golf club head 10.

Further, as illustrated in Fig. 3, a striking plate 12 is engaged to a front side of the body (not labeled) of the golf club head 10, and a hosel 13 is

formed on a side of the body of the golf club head 10. A shaft (not shown) is mounted to the hosel 13. The striking plate 12 can be fixed to the body of the golf club head 10 by insertion, pressing, brazing, welding, or screwing. Alternatively, the striking plate 12 can be integrally formed with the body of the golf club head 10. The body of the golf club head 10 can be integrally made by precision casting, casting, mechanical processing, pressure-casting, forging, injection molding, etc. Alternatively, the body of the golf club head 10 can be made by means of section-by-section engagement.

Fig. 4 shows a second embodiment of the invention, wherein the opening of the recession 11 faces rearward. Further, the shape of the opening of the recession 11 may vary to match the appearance of the golf club and to match the shape of the weight member 20. For example, the opening of the recession 11 may be circular, oval, polygonal, or star-like. Further, the type and color of the filling material 30 can be selected. Alternatively, filling materials 30 of different types and colors can be used at the same time. Thus, in addition to burying the weight member 20 and absorbing vibrations generated as a result of striking a golf ball, the filling material 30 provides an aesthetic appearance on the back of the golf club head 10.

Fig. 5 shows a third embodiment of the invention, wherein the opening of the recession 11 faces downwardly. The filling material 30 is, e.g., a polyurethane elastomeric filling material or rubber to provide a buffering effect and anti-sliding effect while burying the weight member 20 and

absorbing vibrations as a result of striking a golf ball.

Fig. 6 illustrates a fourth embodiment of the invention, wherein a perimeter wall delimiting the recession 11 of the golf club head 10 includes a plurality of grooves 111 adjacent to the opening of the recession 11. The grooves 111 can be arranged to in annular, star-spangled, or irregular manner. The grooves 111 allow the filling material 30 to be securely engaged in the opening of the recession 11 in a “snapping” manner, preventing the filling material 30 from disengaging from the recession 11. The bonding reliability of the weight member 20 is thus improved. Further, to avoid adverse affect to the distribution of the momentum imparted by the striking plate 12, the grooves 111 are preferably formed on a rear side of the striking plate 12.

Fig. 7 shows a fifth embodiment of the invention, wherein the golf club head 10 is a club head of a wooden club that includes a compartment 100, a recession 11, a striking plate 12, and a hosel 13. The recession 11 is an extension extending from the sole toward the compartment 100. A weight member 20 is mounted in the recession 11, and a filling material 30 is then filled into the recession 11 to bury and fix the weight member 20, thereby expediting and simplifying the process for mounting the weight member 20. The filling material 30 also absorbs vibrations generated as a result of striking a golf ball and provides an aesthetic appearance on the back of the golf club head 10, as the case of the second embodiment of Fig. 4.

Fig. 8 shows a sixth embodiment of the invention modified from the



fifth embodiment, wherein the a perimeter wall delimiting the recession 11 of the golf club head 10 includes a plurality of grooves 111 adjacent to the opening of the recession 11. The grooves 111 can be arranged to in annular, star-spangled, or irregular manner. The grooves 111 allow the filling material 5 30 to be securely engaged in the opening of the recession 11 in a “snapping” manner, preventing the filling material 30 from disengaging from the recession 11. The bonding reliability of the weight member 20 is thus improved.

While the principles of this invention have been disclosed in 10 connection with specific embodiments, it should be understood by those skilled in the art that these descriptions are not intended to limit the scope of the invention, and that any modification and variation without departing the spirit of the invention is intended to be covered by the scope of this invention defined only by the appended claims.